



# WMO standards and guidelines for sea ice: ice charting and observations

A presentation for the GCW CryoNet  
Implementation Meeting, First Session

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# Procedures for sea ice standards management

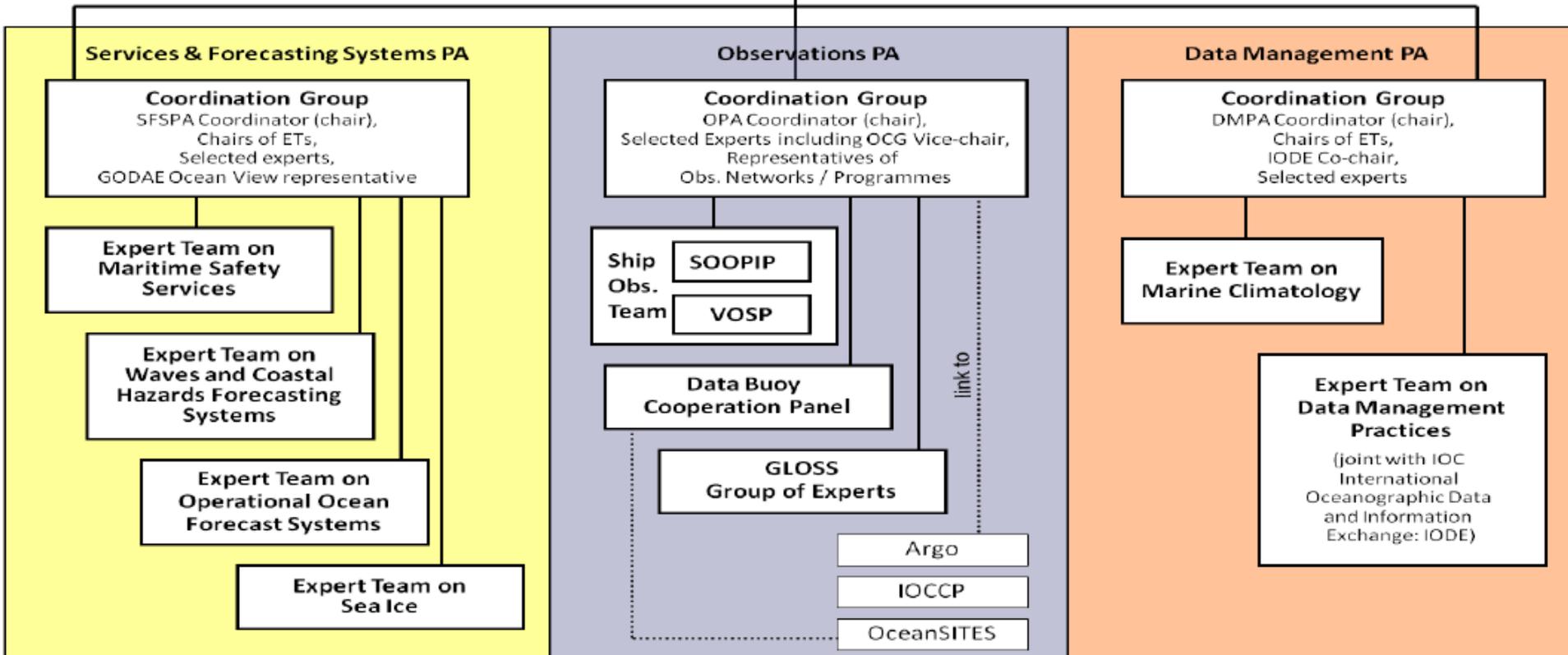
- Within the WMO JCOMM ETSI is responsible for operational sea ice standards including WMO Sea Ice Nomenclature
- JCOMM ETMSS is responsible for GMDSS standards and is developing M.O.C.
  - in part of sea ice input is provided by ETSI
- By agreement with IHO TSMAD, JCOMM ETSI is the formal body responsible for the Ice Objects Catalogue with WMO Secretariat as co-manager of the catalogue
- International Ice Charting Working Group (IICWG)
  - Technical advisory body to ETSI
  - Meets annually

# JCOMM ETSI is responsible body for the WMO operational sea ice standards and sea ice as a 'media' for operations (marine safety)



Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology

**Management Committee**  
 2 Co-Presidents  
 3 PA Coordinators  
 Experts leading priority activities  
 (with participation of representatives of partner programmes/bodies)



# Sea ice observations: what can be coded and how can be relayed to customers ?

- "WMO Sea Ice Nomenclature" (WMO No.259, revision Mar 2010) states what sea ice [drifting and fast ice] and fresh water ice [lake ice] parameters can be described
- WMO SIGRID [1,2,3,] and "Ice objects catalogue" describe how sea ice and fresh water ice should be described
- Under development AARI "Manual for ice observers" and CIS MANICE or "Manual ice observations" under development

# Procedures for sea ice standards management

## Top level harmonizing sea ice standard

- "WMO Sea Ice Nomenclature" (WMO No.259, revision Mar 2010)
  - Volumes 1 "Terminology" (terms and definitions)
  - Volumes 2 "Illustrated glossary"
  - Volume 3 "International system of sea ice symbols" (coding tables and symbols for ice charts)
  - From 2007 WMO No.259 is formally managed in electronic form
  - 193 terms and definitions in 13 sections supporting sea ice observations at a point", "ice analysis (ice charting)" and sea ice climatology [in part of operations]

# WMO Sea Ice Nomenclature in electronic form

WMO/OMM/BMO - No.259 • Edition 1970 - 2004

## TERMINOLOGY - Volume I

	<a href="#">English</a>	<a href="#">Français</a>	<a href="#">Русский</a>	<a href="#">Español</a>
By subject				
In alphabetical order				
Equivalents in 4 languages				
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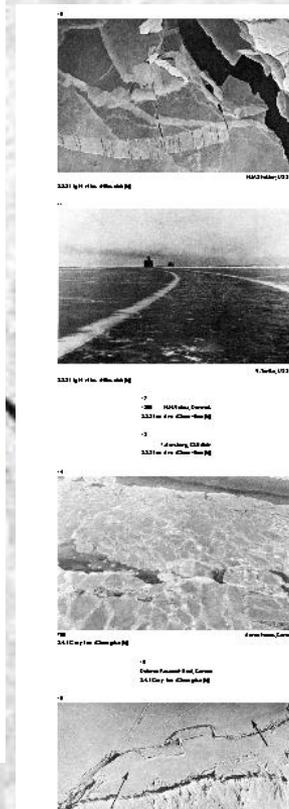
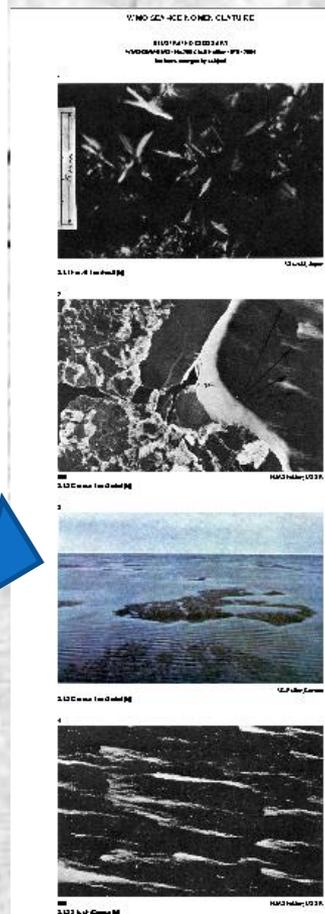
## ILLUSTRATED GLOSSARY - Volume II

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Photos by subject				
Photos in alphabetical order				
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### WMO SEA-ICE NOMENCLATURE

TERMINOLOGY  
WMO/OMM/BMO - No 259 & bull Edition 1970 - 2004  
Linguistic equivalents

Item No.	English	French	Russian	Spanish
1	<b>Floating ice:</b> Any form of ice found floating in water. The principal kinds of floating ice are <i>lake ice</i> , <i>river ice</i> , and <i>sea ice</i> which form by the freezing of water at the surface, and <i>glacier ice</i> ( <i>ice of land origin</i> ) formed on land or in an <i>ice shelf</i> . The concept includes ice that is stranded or grounded.	<b>Glace flottante:</b> Toute glace flottant dans l'eau. Les principales sortes de <i>glace flottante</i> sont la <i>glace de lac</i> , la <i>glace de rivière</i> , la <i>glace de mer</i> qui se forme par congélation de l'eau de mer en surface, et la <i>glace de glacier</i> ( <i>glace d'origine terrestre</i> ) formée sur la terre ferme ou provenant d'un <i>plateau de glace</i> . Ce concept comprend aussi la <i>glace jetée en côte</i> ou <i>échouée</i> .	<b>Плавающий лёд:</b> Любая форма льда, плавающего в воде. Основными видами <i>плавающего льда</i> являются: <i>озерный лёд</i> , <i>речной лёд</i> , <i>морской лёд</i> , которые образуются вследствие замораживания воды у поверхности, и <i>ледничерный лёд</i> ( <i>лед материкового происхождения</i> ), образующийся на суше или на ледяном шельфе. Это понятие включает и лёд, севший на мель.	<b>Hielo Flotante:</b> Cualquier forma de hielo que se encuentra flotando en el agua. Las principales clases de hielo flotante son el <i>hielo lacustre</i> , el <i>hielo fluvial</i> y el <i>hielo marino</i> , que se forman por la congelación del agua en superficie; y el <i>hielo de glacier</i> ( <i>hielo de origen terrestre</i> ) formado sobre tierra o en una <i>meseta</i> de hielo. El concepto incluye hielo encallado o varado.
1.1	<b>Sea ice:</b> Any form of ice found at sea which has originated from the freezing of sea water.	<b>Glace de mer:</b> Toute forme de glace trouvée en mer qui résulte du gel de l'eau de mer.	<b>Морской лёд:</b> Любая форма льда, встречающегося в море и образовавшегося в результате замораживания морской воды.	<b>Hielo marino:</b> Cualquier forma de hielo en el mar originado por la congelación de sus aguas.
1.1.1	<b>Fast ice:</b> Cf. 31 - <i>Sea ice</i> which forms and remains fast along the coast, where it is attached to the shore, to which it is fast.	<b>Banquise côtière:</b> Voir 31 - <i>Glace de mer</i> qui se forme et reste fixe le long de la côte, où elle est attachée à la rive, à laquelle elle est faste.	<b>Припай:</b> См.31 - <i>Морской лёд</i> , который образуется и остается неподвижным вдоль побережья, где он приморажен к берегу и остается	<b>Hielo fijo:</b> Véase 31 - <i>Hielo marino</i> que se forma y permanece fijo a lo largo de la costa, quedando unido a la costa, a un fuste o cordón de hielo, al



# Procedures for sea ice standards management

## Sea ice information transport standards

- "SIGRID-3: a vector archive format for sea ice charts" (WMO/TD-No. 1214, revision 2 Mar 2010) is the main transport format for ice charts at a level of ice services.
  - geometry based on shapefile format
  - thematic content and coding compliant with WMO No.259
  - supports all types of sea ice objects: polygons (areas), lines and points
- Ice Object Catalogue (version 4.1 - Mar 2007 , version 5.0.1 - Mar 2010 & 5.1 - Feb 2012) is a standard sea ice content for ENC.
  - thematic content and coding compliant with WMO No.259
- WMO GRiB and NetCDF are used to support sea ice input/export for numerical models

# National Ice Services worldwide

## Northern hemisphere

- ❑ Arctic Ocean: Russia, USA
- ❑ Canadian Arctic: Canada
- ❑ Eurasian Arctic, Bering and White Seas: Russia
- ❑ North Atlantic and Barents Sea: Norway
- ❑ North Pacific, Bering, Beaufort and Chukcha Seas: USA
- ❑ Greenland Sea, Davis Strait, Baffin Bay: Denmark, Canada
- ❑ Iceland Sea: Iceland
- ❑ Baltic Sea (BSIS: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Netherlands, Norway, Poland, Russia, Sweden)
- ❑ Far East Seas: China, Japan, Russia, USA
- ❑ Caspian Sea: Russia
- ❑ Great Lakes: NAIS (NAIS: Canada/USA)

## Southern Hemisphere

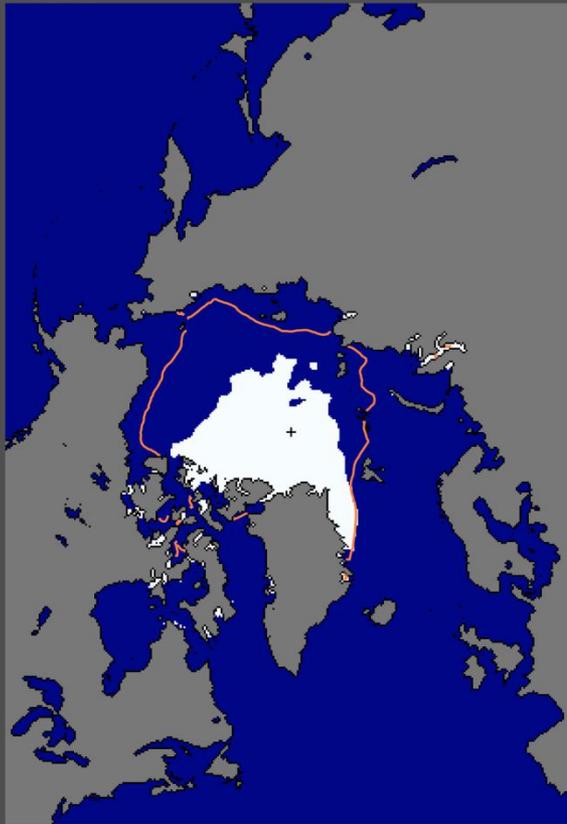
- ❑ Hemispheric analysis: USA, Russia
- ❑ Regional analysis: USA, Norway
- ❑ Sectoral analysis: Argentina, Australia, Russia



Source: WMO Publication  
No.574 “Sea Ice Information  
Services in the World”, edition  
2010

# Why the ice charts ?

Sea Ice Extent  
09/16/2012

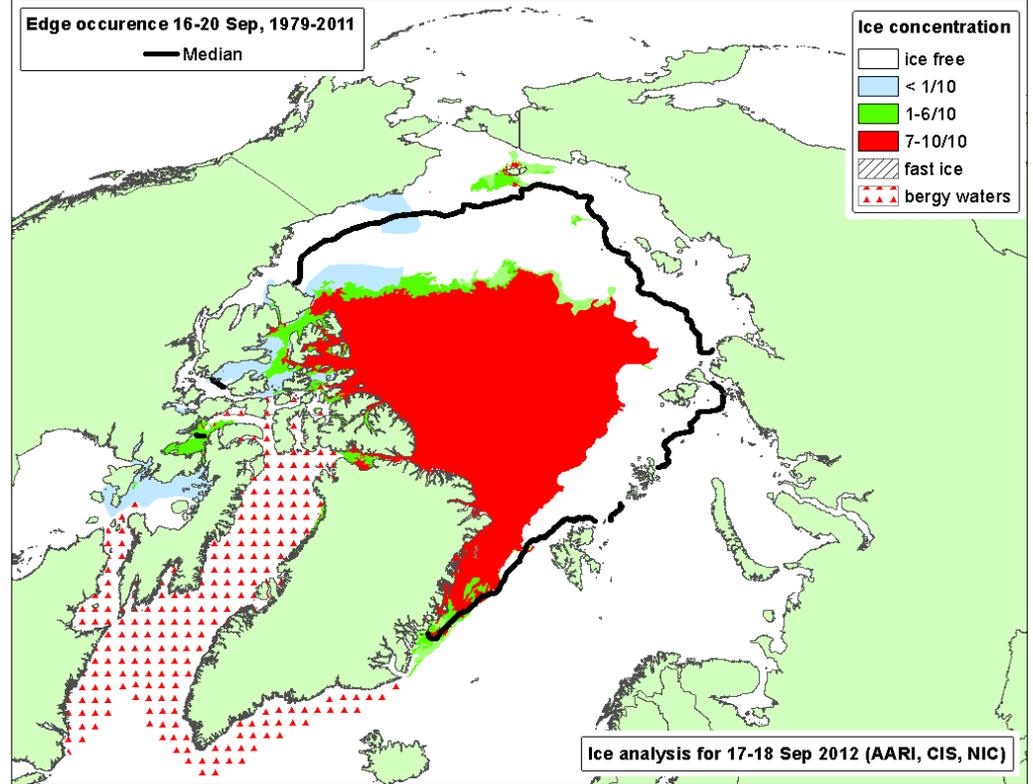


National Snow and Ice Data Center, Boulder, CO

median  
1979-2000

Edge occurrence 16-20 Sep, 1979-2011

— Median



Ice concentration

- ice free
- < 1/10
- 1-6/10
- 7-10/10
- fast ice
- bergy waters

Ice analysis for 17-18 Sep 2012 (AARI, CIS, NIC)

# Checkpoints for ice analysis worldwide

1880s 1900 1920 1940 1960 1980 2000 2010

## Arctic

DMI ice edge, Greenland waters ice charts, Greenland waters

Met.no ice edge, N Atlantic ice charts, N Atlantic

AARI ice extent, NSR 1933: ice charts, NSR

CIS 1959: ice charts, Canadian Arctic

NIC reg. 1972: ice charts, NH

BSIM ice in Baltic code ice charts, Baltic Sea

## Antarctic

AARI 1956: reg 1971: ice charts, sectoral

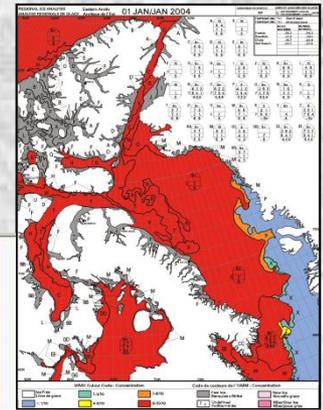
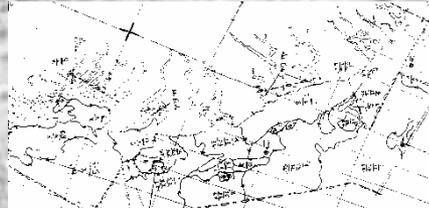
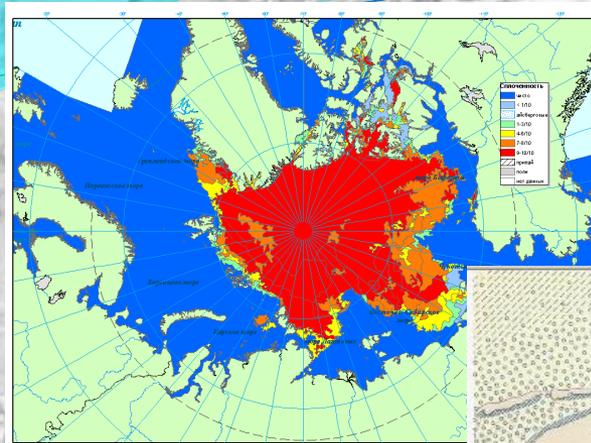
NIC 1973: ice charts, SH

EMSR-SSMR-SSM/I

EMSR 1978: SSMR-SSM/I



# Ice logistics portal: Arctic, Antarctic



World regions: [Southern](#) | [Northern 90W](#) | [Northern 90E](#) | [MetAreas](#)

[Home](#) | [Contact Us](#)

## Background Information

- >> [Sea Ice Service of the World](#)
- >> [Manual of Standard Procedures for Observing and Reporting Ice Conditions](#)
- >> [SIGRID-3: A Vector Archive Format for Sea Ice Charts](#)
- >> [Ice Chart Colour Code Standard](#)

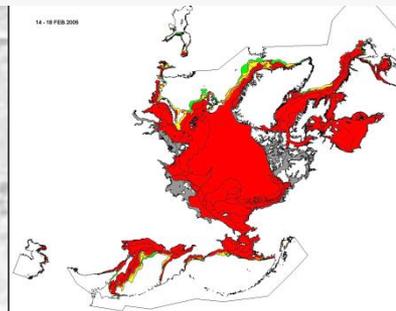
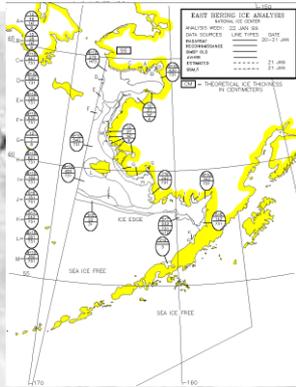
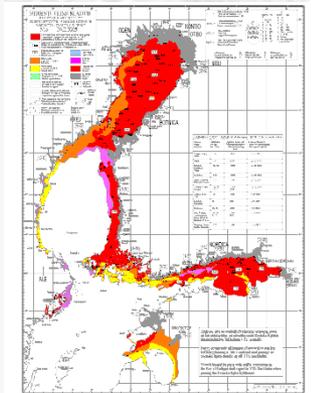
## Links

- >> [JCOMM-ETSI](#)
- >> [GMDSS-MetArea](#)



The IPY Ice Logistics Portal is a joint initiative of JCOMM-ETSI and Polar View, aimed at creating a convenient point of access to operational sea ice information produced by the world's ice services. Access to products is provided via a series of pre-defined regions for both the Arctic and the Antarctic. Since the primary focus of the IPY Ice Logistics Portal is on operational sea ice data (i.e. ice charts), only the most recent information is displayed for any given region.

For BAS Envisat SAR data in the Antarctic go to [www.polarview.aq](http://www.polarview.aq)

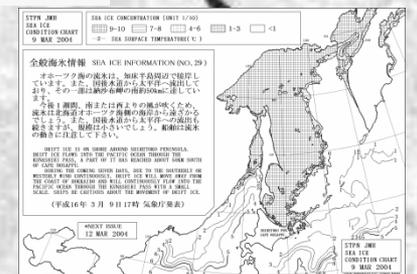
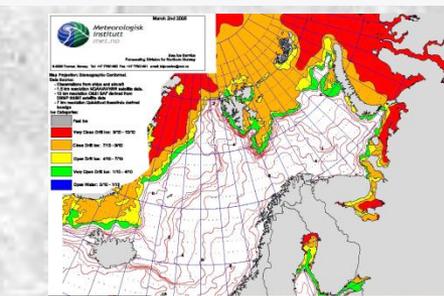


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# Sea ice information in WIS: SIGRID-3 is very friendly for WIS

